



National Aeronautics and Space Administration



10<sup>th</sup> August, 2015

## Nanosatellite Launch Adapter System (NLAS) –Overview



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# NLAS Objectives & Relevance

## **Objectives:**

- Increase the access to space by having the capability to deploy 8x 3U, 4x 6U or a combination of 1U, 1.5U, 2U, 3U & 6U nano-satellites
- Provides a modular platform with a configurable sequence and schedule for deploying multiple secondary nano-satellite payloads from launch vehicles

## **Relevance/Impact:**

- Partnership with Operationally Responsive Space (ORS) Office
- NLAS provides a user configurable modular deployment system that reduces launch vehicle integration times for secondary payloads
- NLAS provides the manifest and access to space capabilities for a variety of secondary nano-satellites ranging that are able to perform space science, including Astrophysics, Exobiology, Heliophysics, Earth Science and possibly even Planetary Science.
- NLAS also enables the flight demonstration of new technologies in the space environment by providing a greater number of opportunities for access to space and hosting of these technologies on nano-satellite platforms.
- US Government has technology transferred the designs to assist and accelerate the small/cubesat industry
- Industry has adopted and extended these designs with next generation Adapters and Dispensers available from Commercial vendors



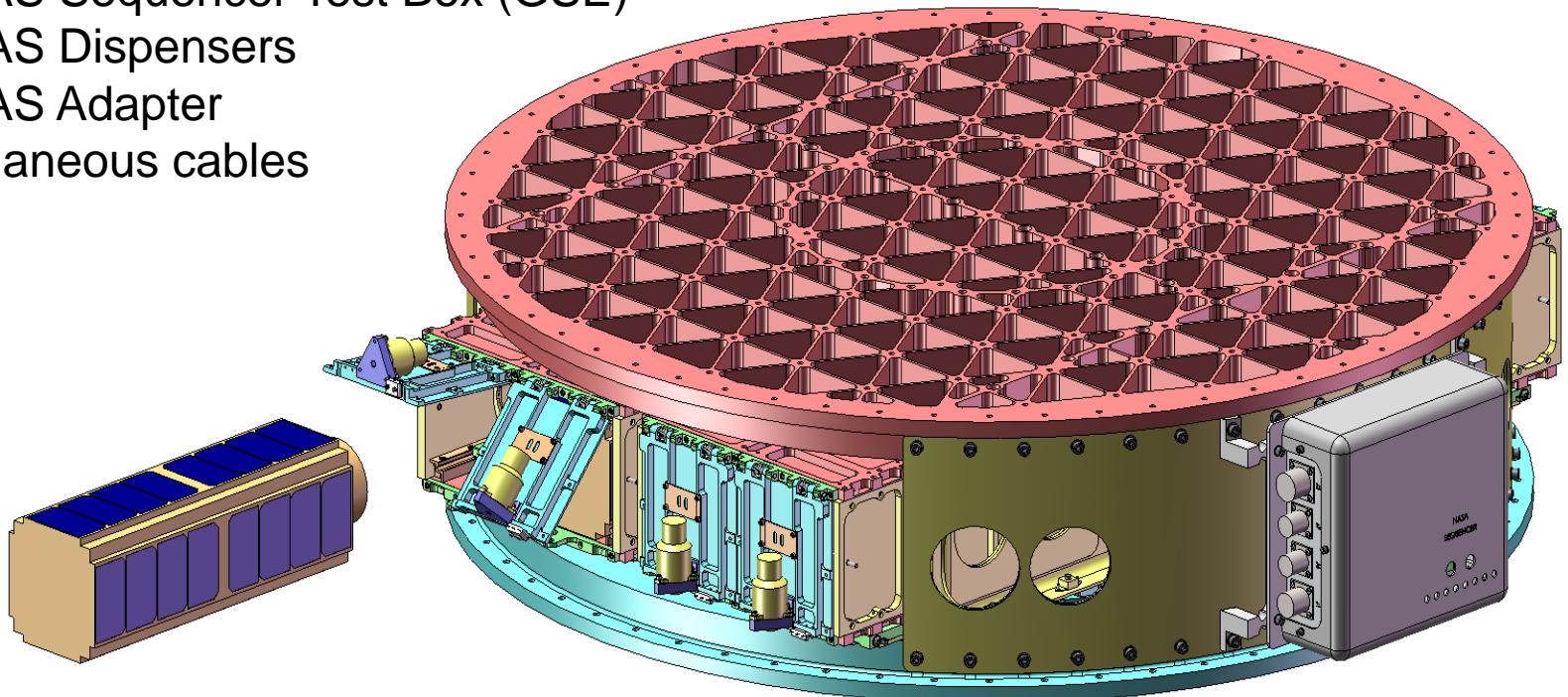
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## NLAS Overview

NanoSatellite Launch Adapter System includes:

- 1x NLAS Sequencer
- 1x NLAS Sequencer Test Box (GSE)
- 4x NLAS Dispensers
- 1x NLAS Adapter
- Miscellaneous cables



Adapter: ~102 cm / 40 inches in Diameter

System mass: ~ 95 kg / 210 lbs (excluding payloads)

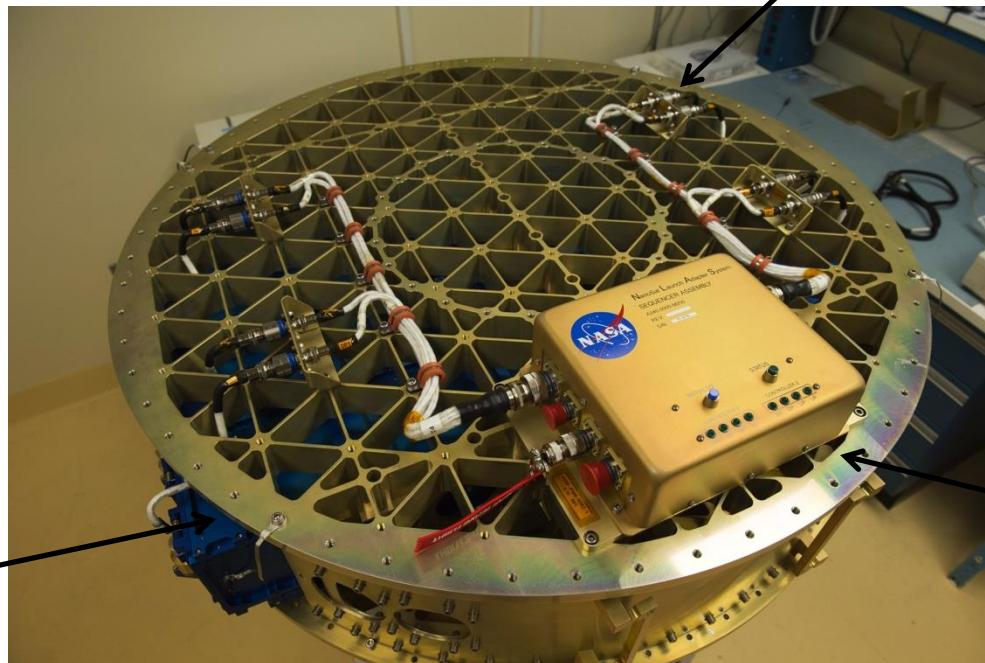
Payload capacity: 24U up to 56 kg / 123.4 lbs



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## NLAS Elements During I&T



NLAS Dispenser



NLAS Adapter

NLAS Sequencer

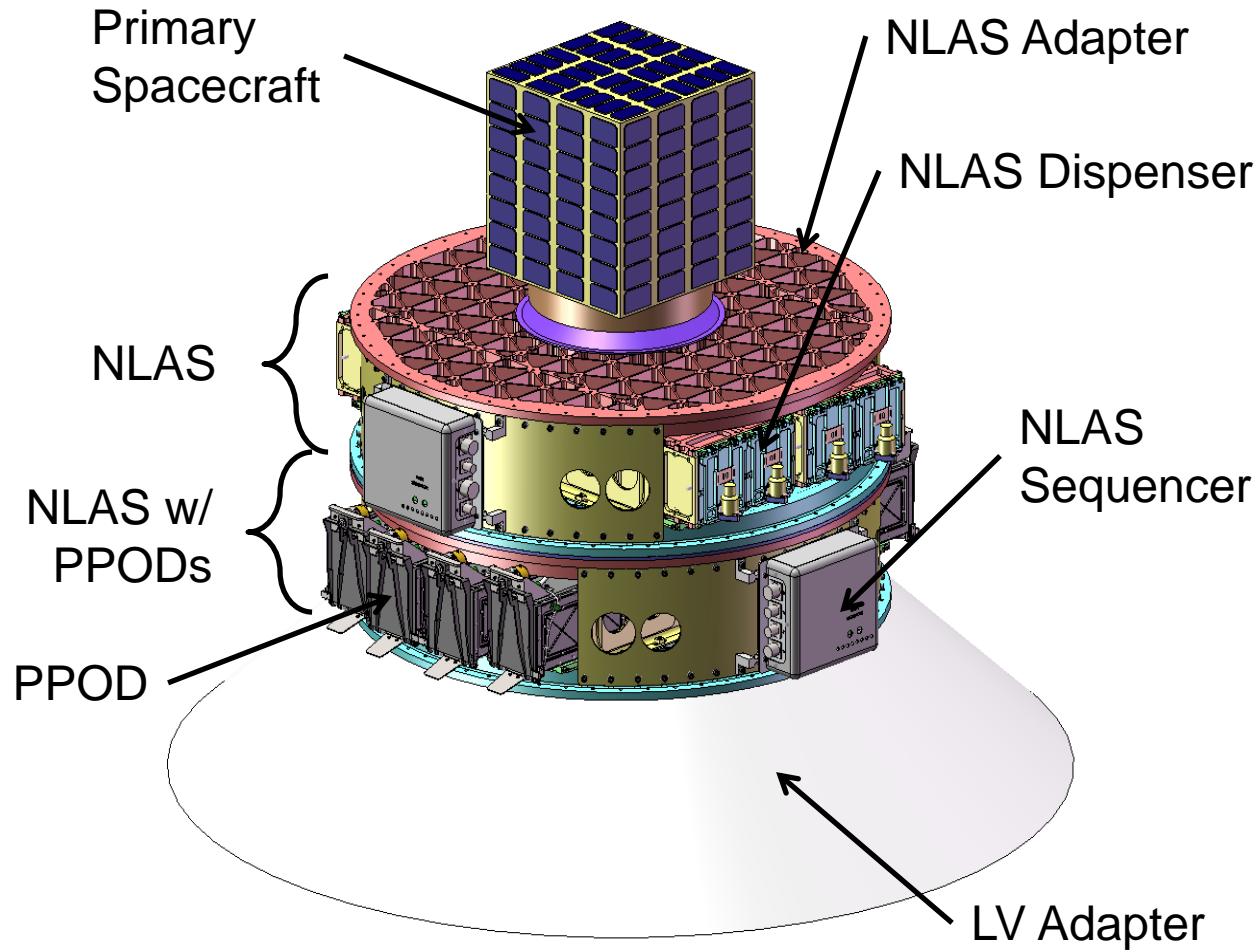




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## Example of 2x NLAS In A Launch Vehicle Stack

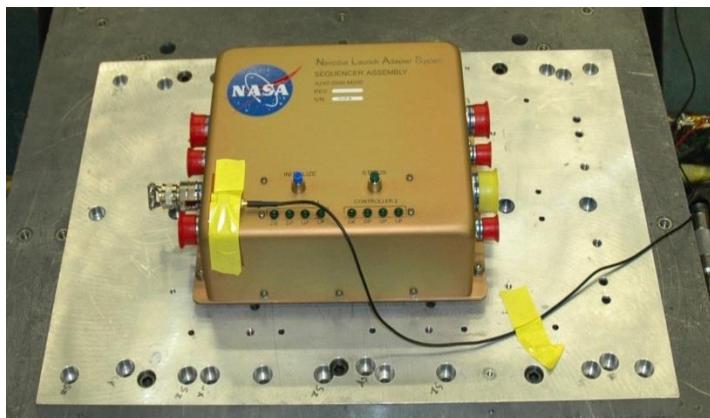




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## NLAS Sequencer



Successfully flown on 19 November 2013!

- Size: ~10 x 8 x 3.7 inches
- Mass: ~1.9 kg / 4.2 lbs
- Fully programmable time sequence for all outputs from 1 second to 6 hours
- Single input signal from launch vehicle
- 8x Output signals for PPOD or NLAS Dispensers actuator
- 1x Auxiliary output for additional device or “Daisy Chaining” of Sequencers
- Internally powered (~2 month standby power, 6 hour+ operational power)
- LED status indicators
- Redundant controller boards
- Redundant output pulses
- Hardware and software noise rejection for LV input signal
- Remove & connect before flight inhibits
- Patent pending, licensing available

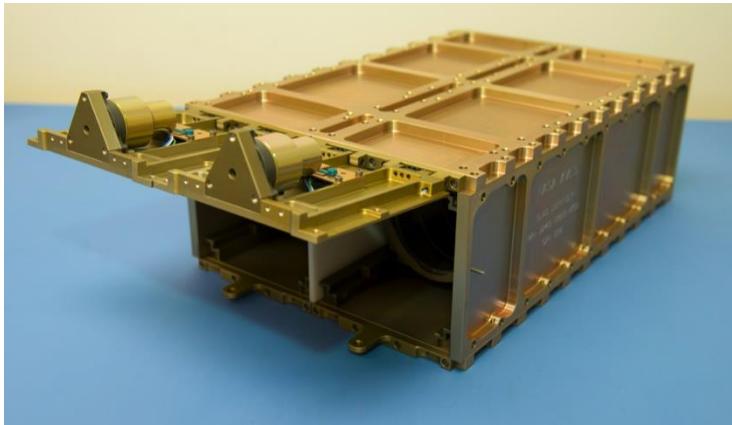


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## NLAS Dispenser

Successfully flown on 19 November 2013!



- Size: ~10.5 x 18.3 x 5.6 inches
- Mass: ~6.3 kg 3U / 5.4 kg 6U
- Spring energized deployer
- Reconfigurable design support either two 3U bays or a single 6U bay
- Payload mass: 2x 6kg (3U) / 14.0 kg (6U)
- Ejection velocity: ~1.5m/s for 6.0kg 3U payload
- Resettable TiNi actuators with redundant triggers
- Multiple mounting orientations
- Designed to operate at -18°C to +50 °C (0°F to +122°F)
- Shocked and Random Vib'd to GEVS
- Design release package coming soon



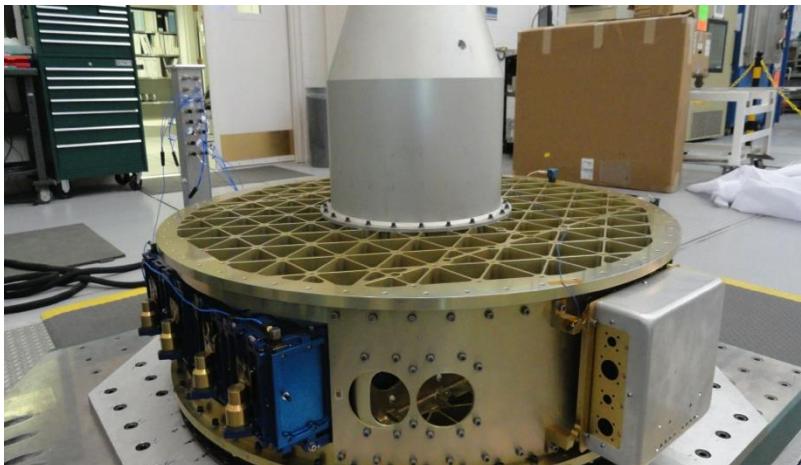


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## NLAS Adapter

Manifested for launch in CY2015



- Size: ~40 inches diameter x 10 inches
- Mass: ~63.3 kg / 139.6 lbs
- Interfaces to LV uppers stage and primary spacecraft
- Standard LV mating interfaces:
  - 38.81 inch diameter bolt circle
  - 15 inch diameter bolt circle
- Accommodates of 24U of deployers:
  - 4x NLAS Dispensers,
  - 8x CalPoly PPODs,
  - Or a combination of both
- Mounting locations for NLAS Sequencers and miscellaneous cables
- Auxiliary mounting locations on Isogrid
- Stackable for multiple systems in a single launch

